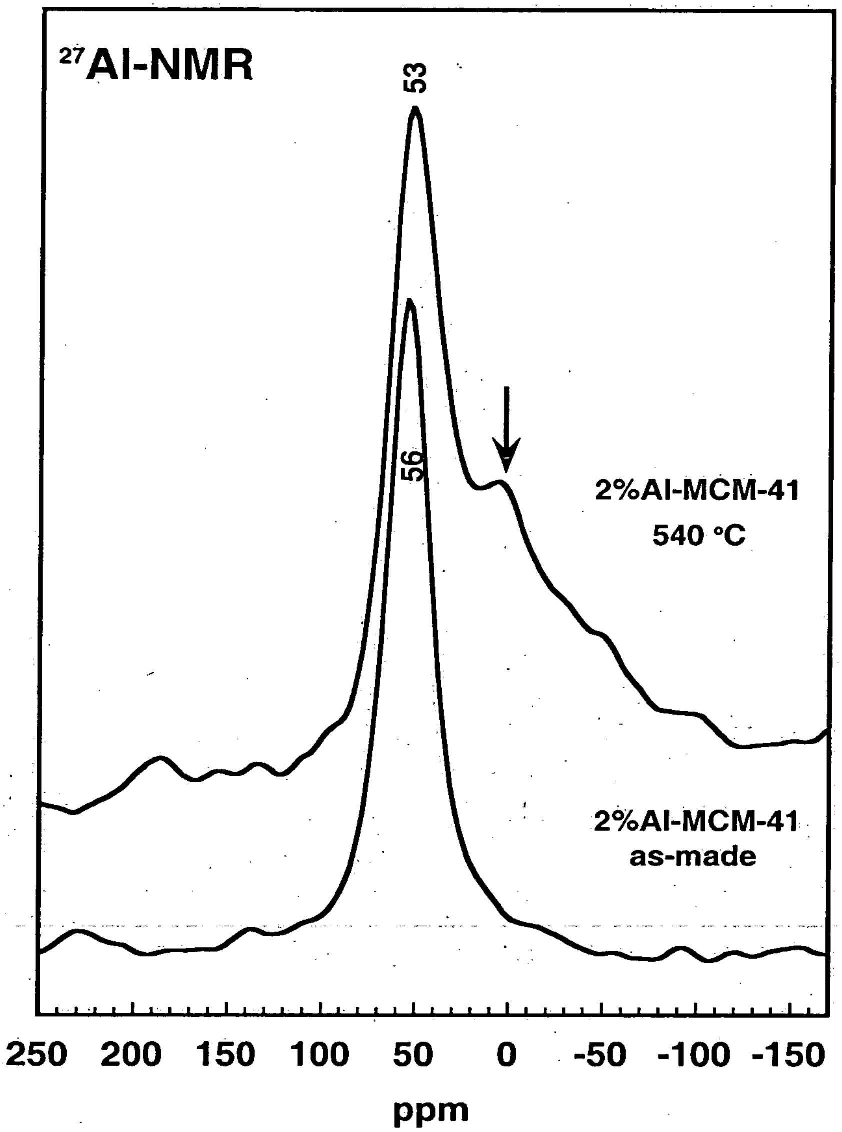

$^{27}$Al-NMR
53
56
2%Al-MCM-41
540 °C
2%Al-MCM-41
as-made
250
200
150
100
50
0
-50
-100
-150
ppm

Figure 1

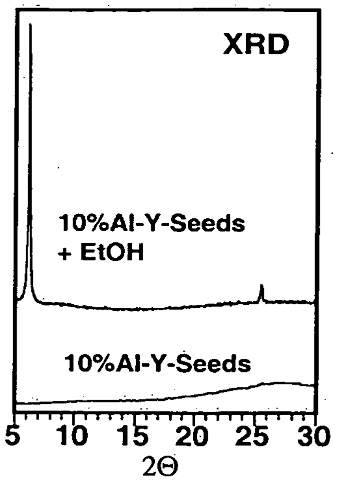


Figure 2A

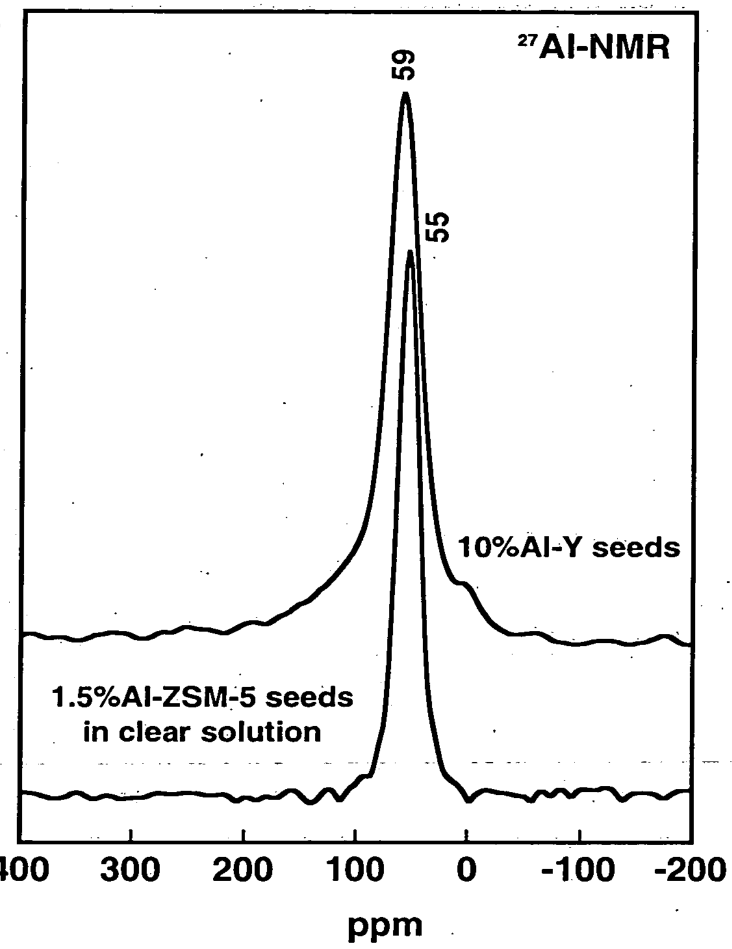


Figure 2

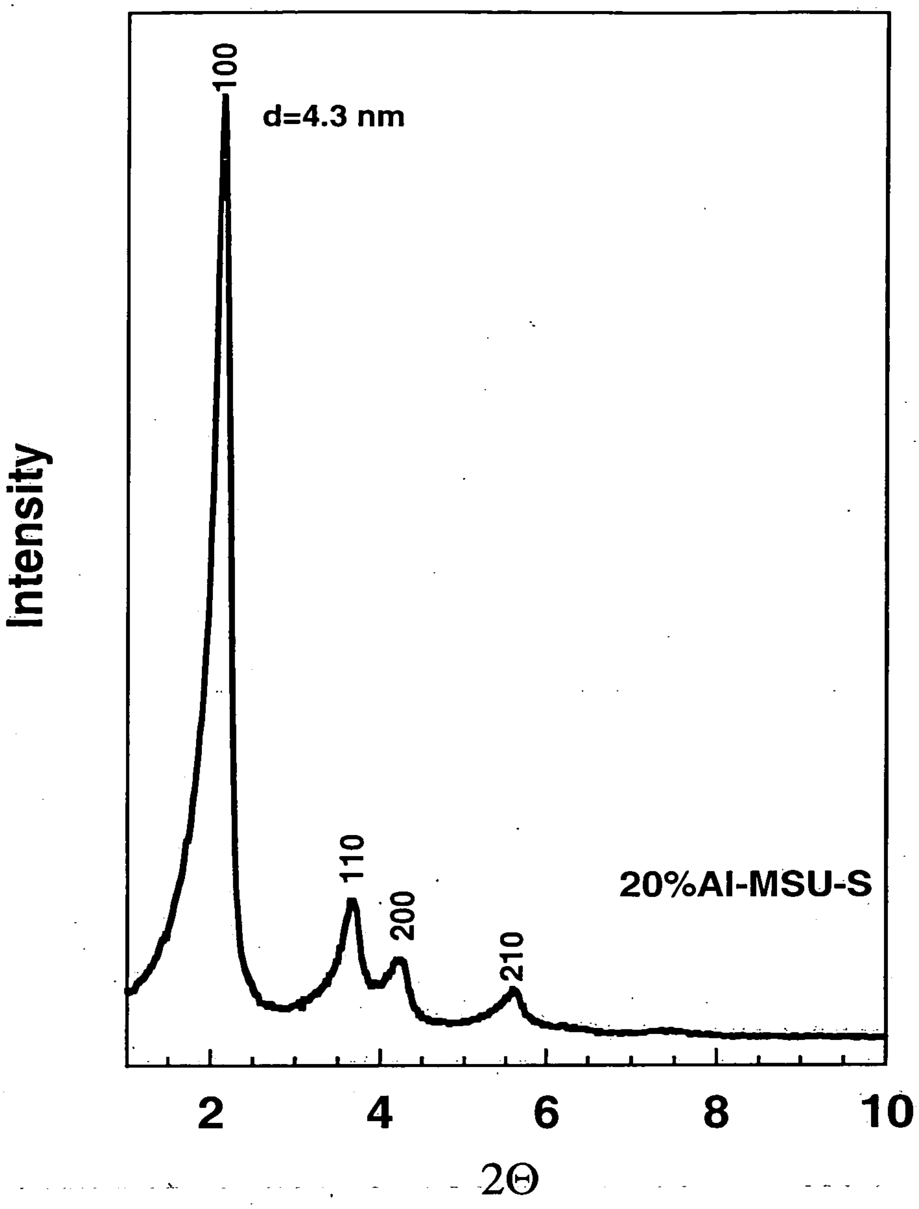
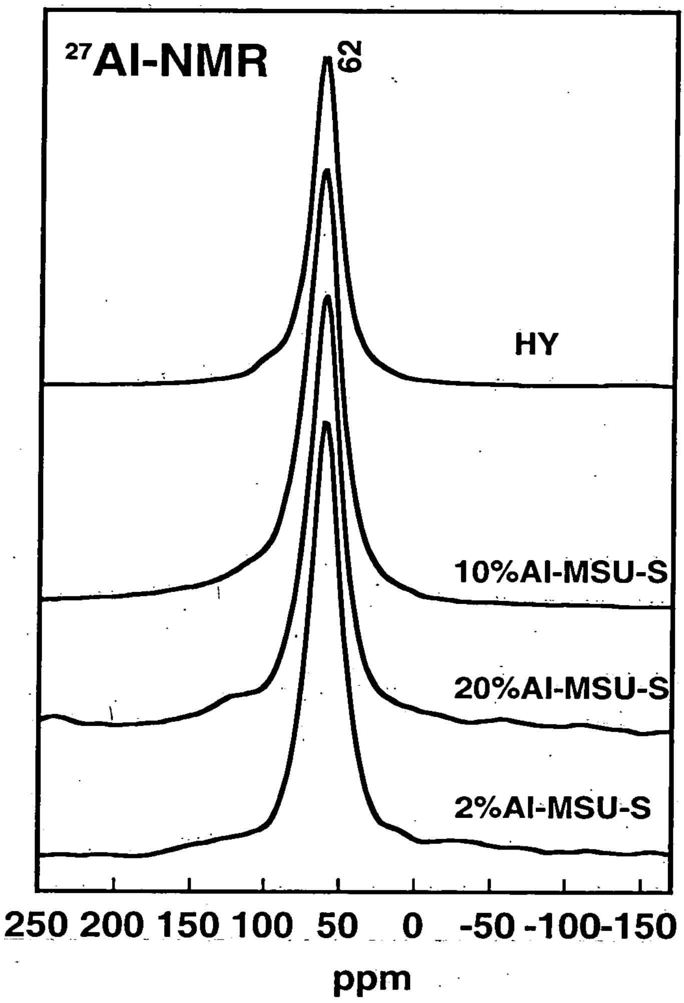


Figure 3



$^{27}$Al-NMR
62
HY
10%Al-MSU-S
20%Al-MSU-S
2%Al-MSU-S
250 200 150 100 50 0 -50 -100 -150
ppm

Figure 4

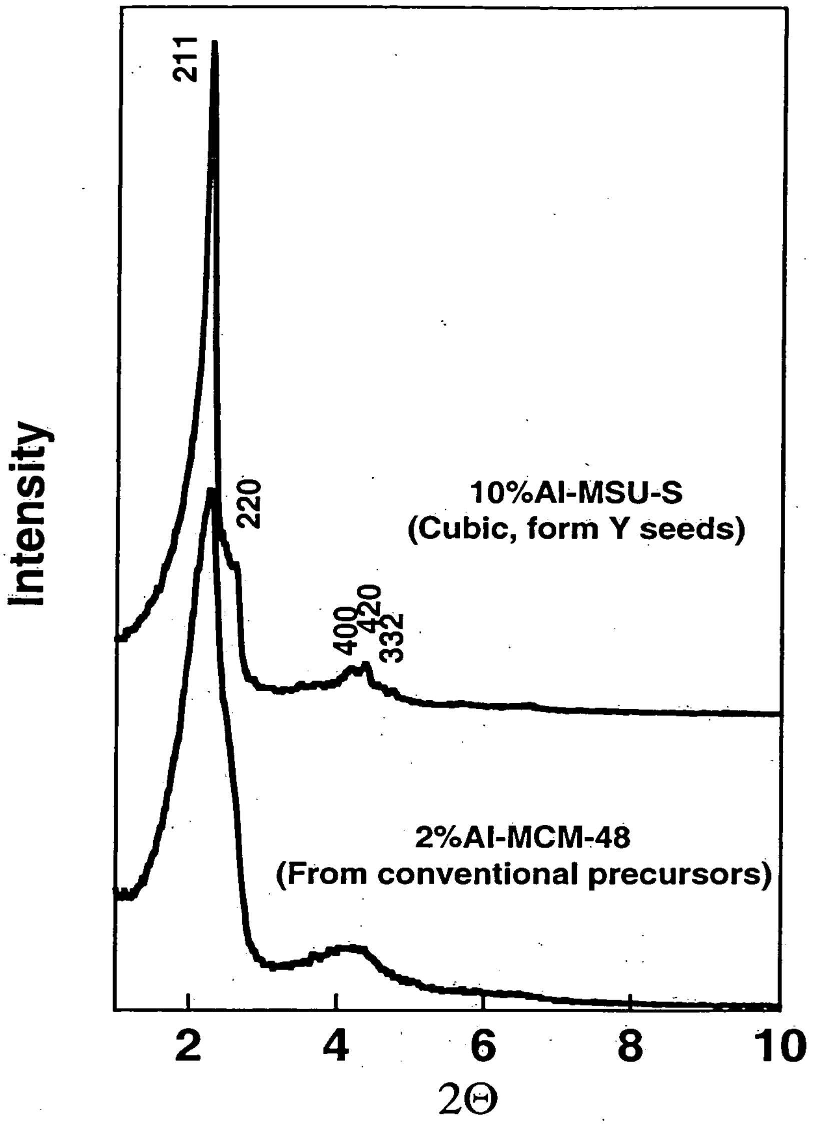
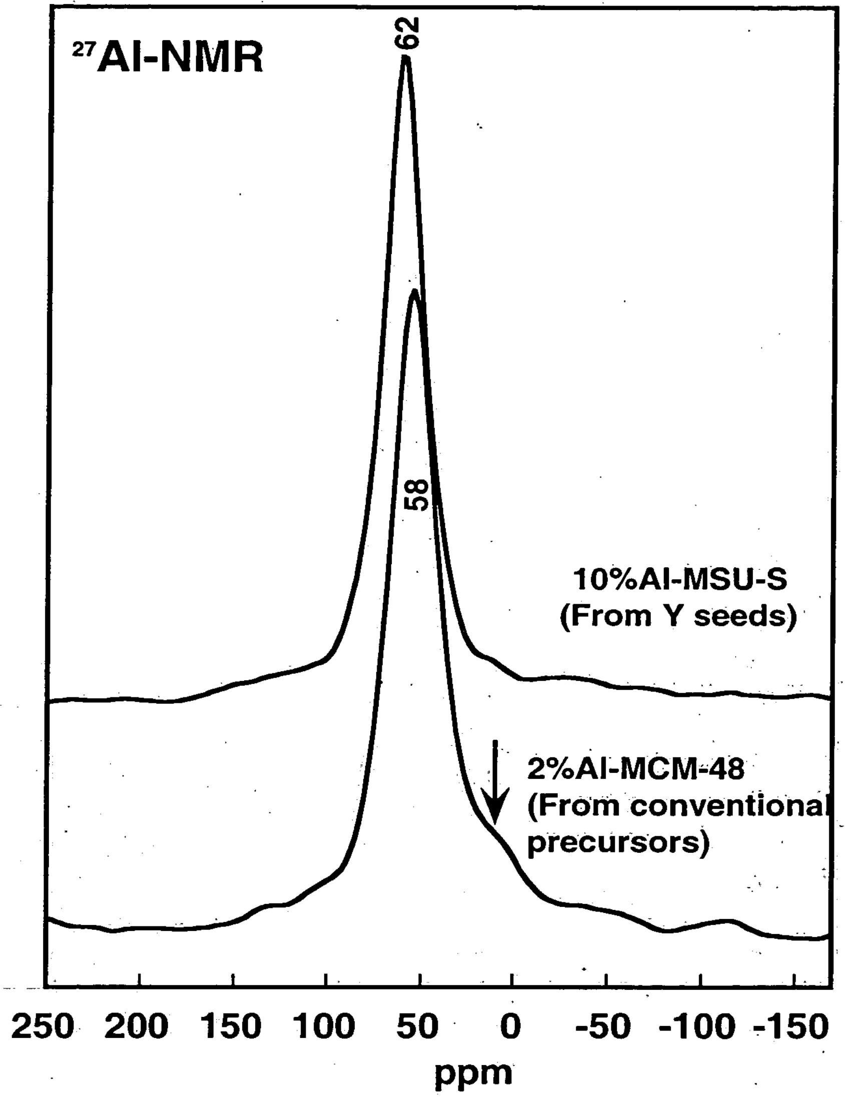

211
220
400
420
332
Intensity
10%Al-MSU-S
(Cubic, form Y seeds)
2%Al-MCM-48
(From conventional precursors)
2
4
6
8
10
2Θ

Figure 5



$^{27}$Al-NMR
62
58
10%Al-MSU-S
(From Y seeds)
2%Al-MCM-48
(From conventional
precursors)
250
200
150
100
50
0
-50
-100
-150
ppm

Figure 6

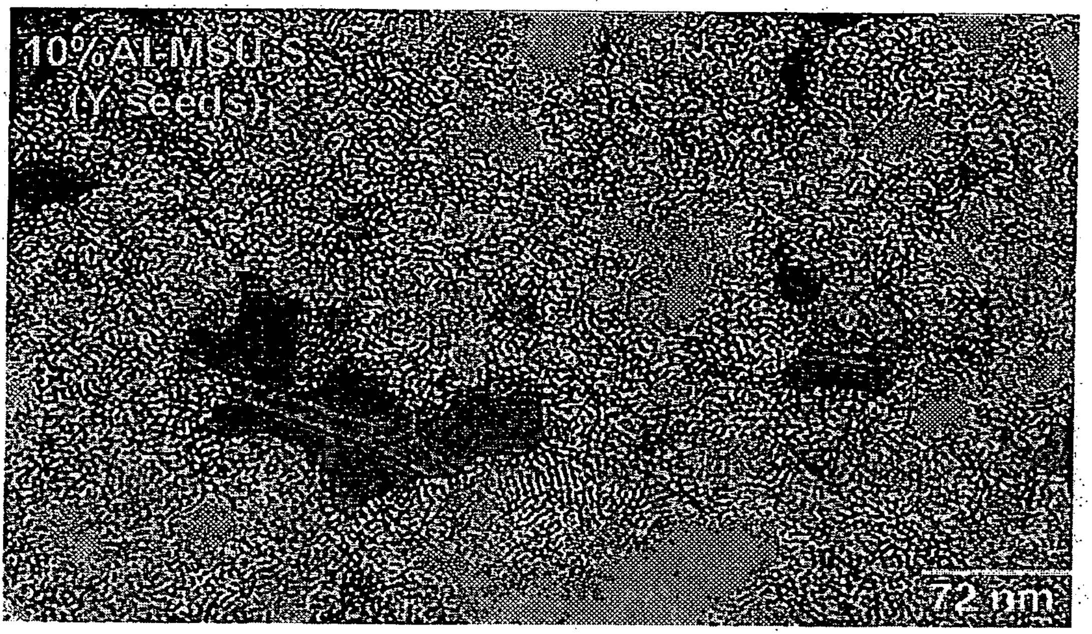


Figure 7

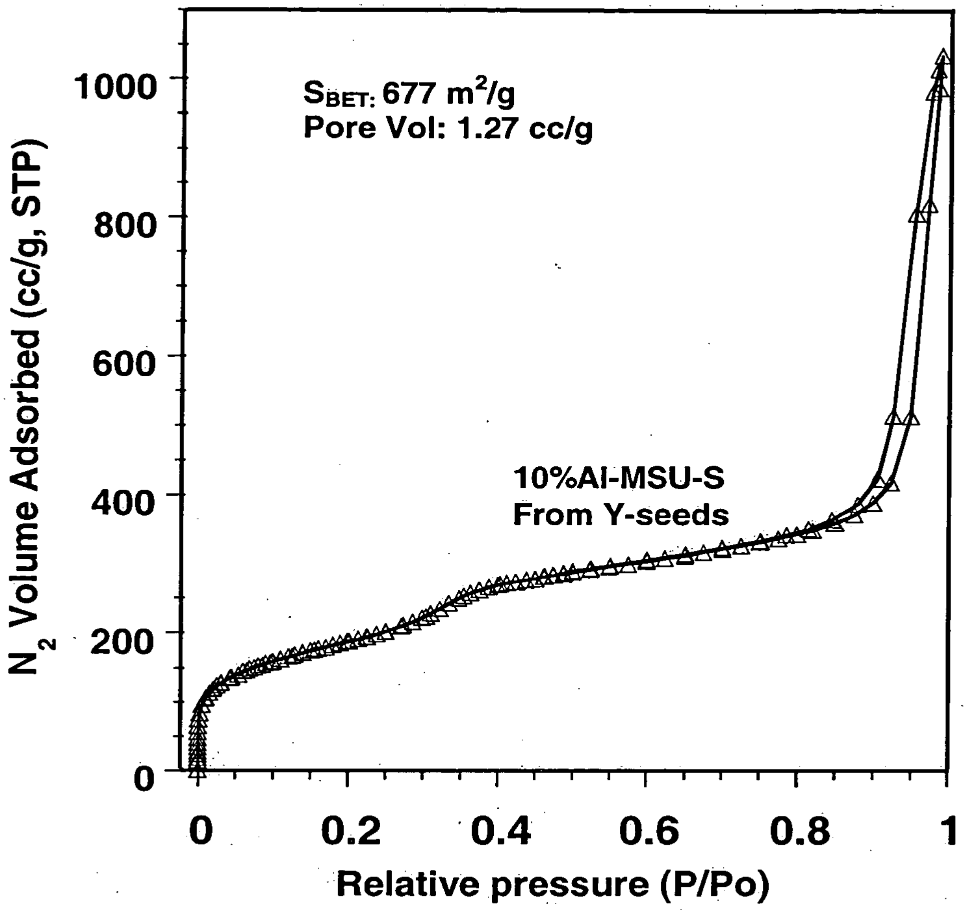

S$_{BET}$: 677 m$^2$/g
Pore Vol: 1.27 cc/g
10%Al-MSU-S
From Y-seeds
N$_2$ Volume Adsorbed (cc/g, STP)
1000
800
600
400
200
0
0
0.2
0.4
0.6
0.8
1
Relative pressure (P/Po)

Figure 8

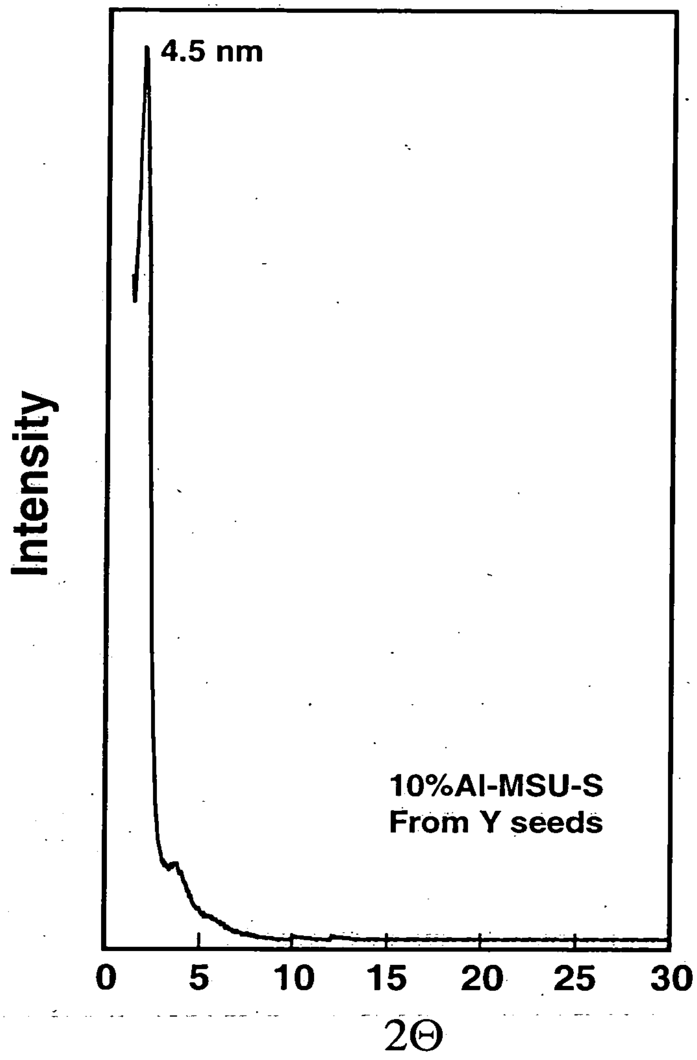


Figure 9

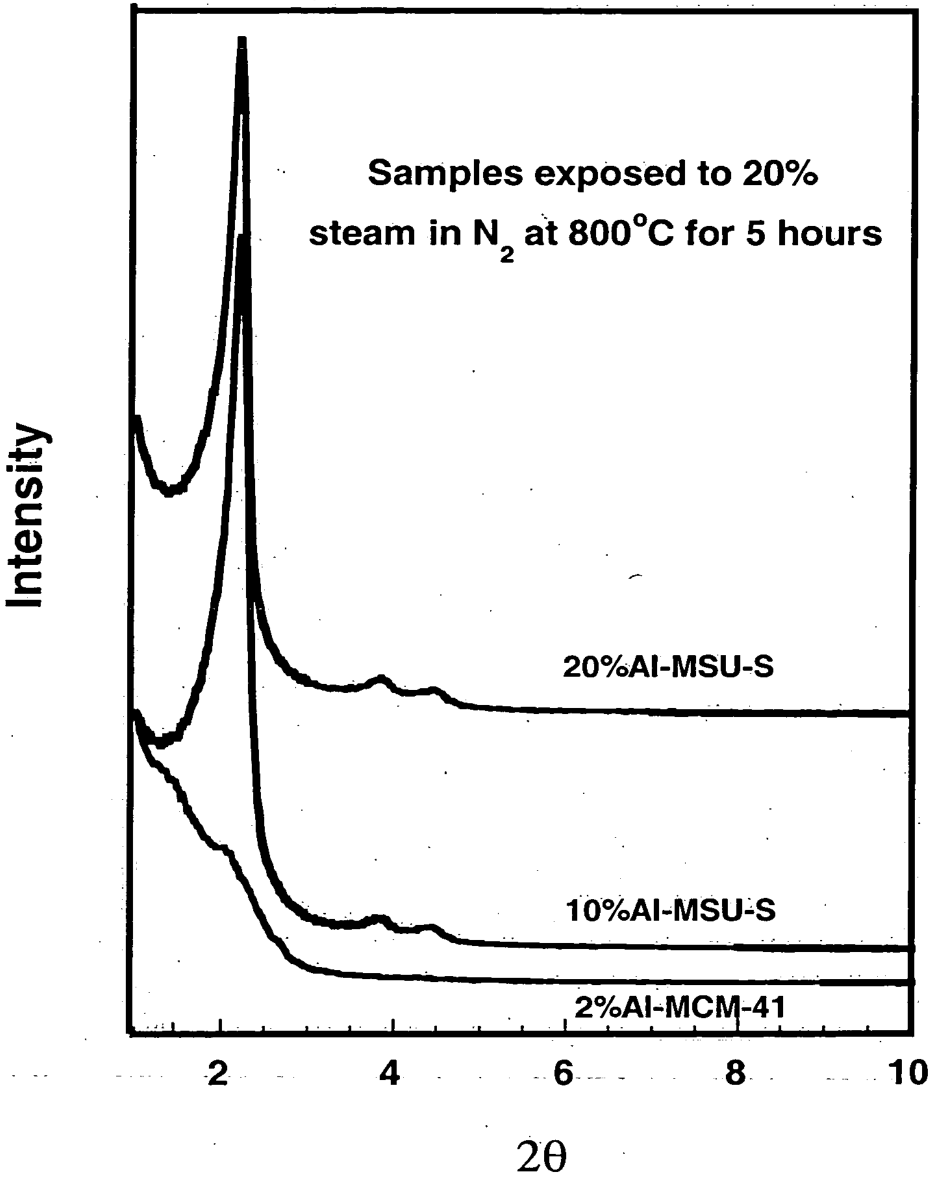

Samples exposed to 20% steam in $N_2$ at 800°C for 5 hours
Intensity
20%Al-MSU-S
10%Al-MSU-S
2%Al-MCM-41
2
4
6
8
10
2θ

Figure 10

# Testing of Mokaya's Al-MCM-41(Si/Al=6.1)

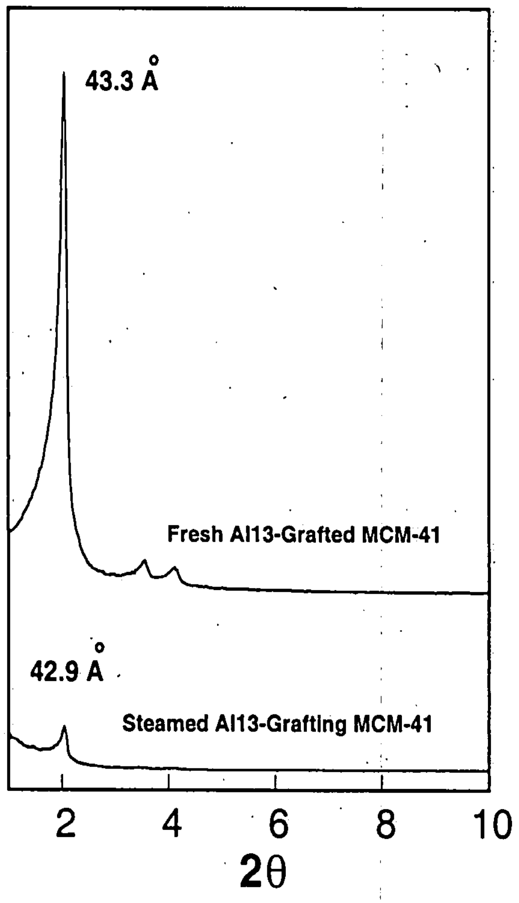


Figure 11A

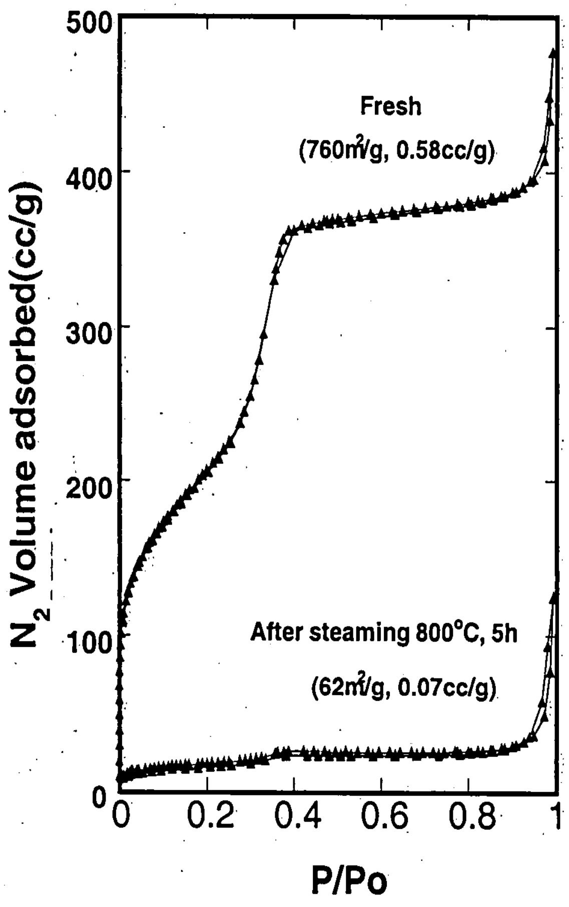


Figure 11B

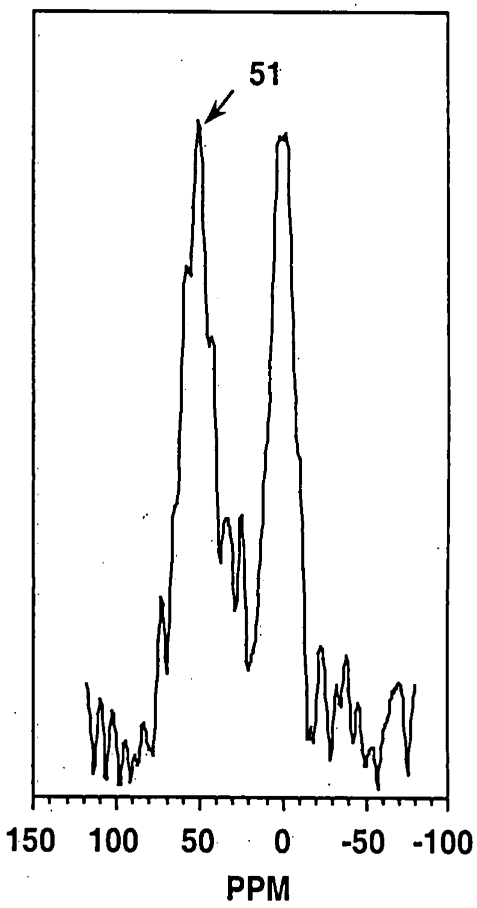


Figure 11C

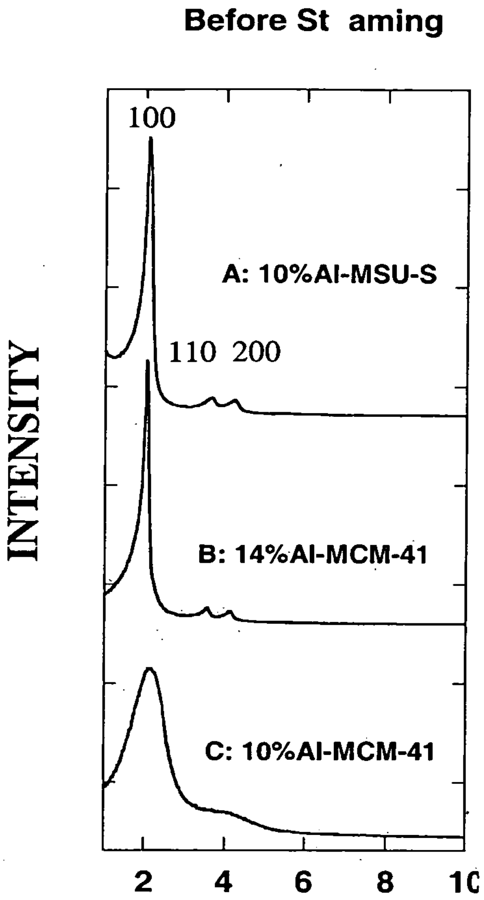


Figure 12A

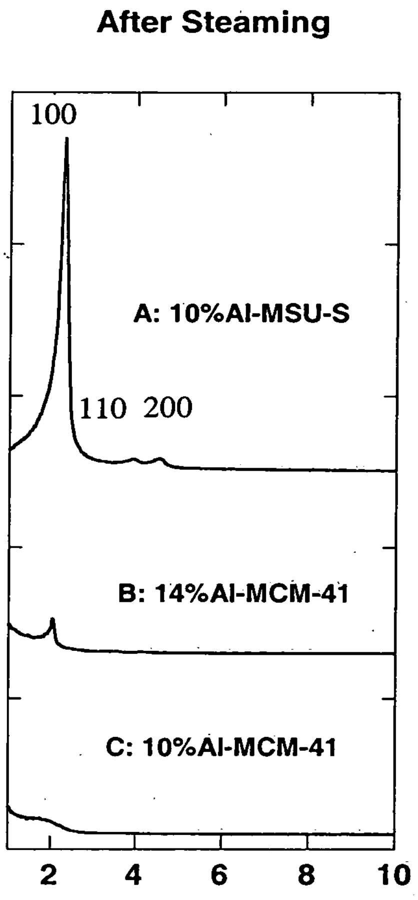


Figure 12B

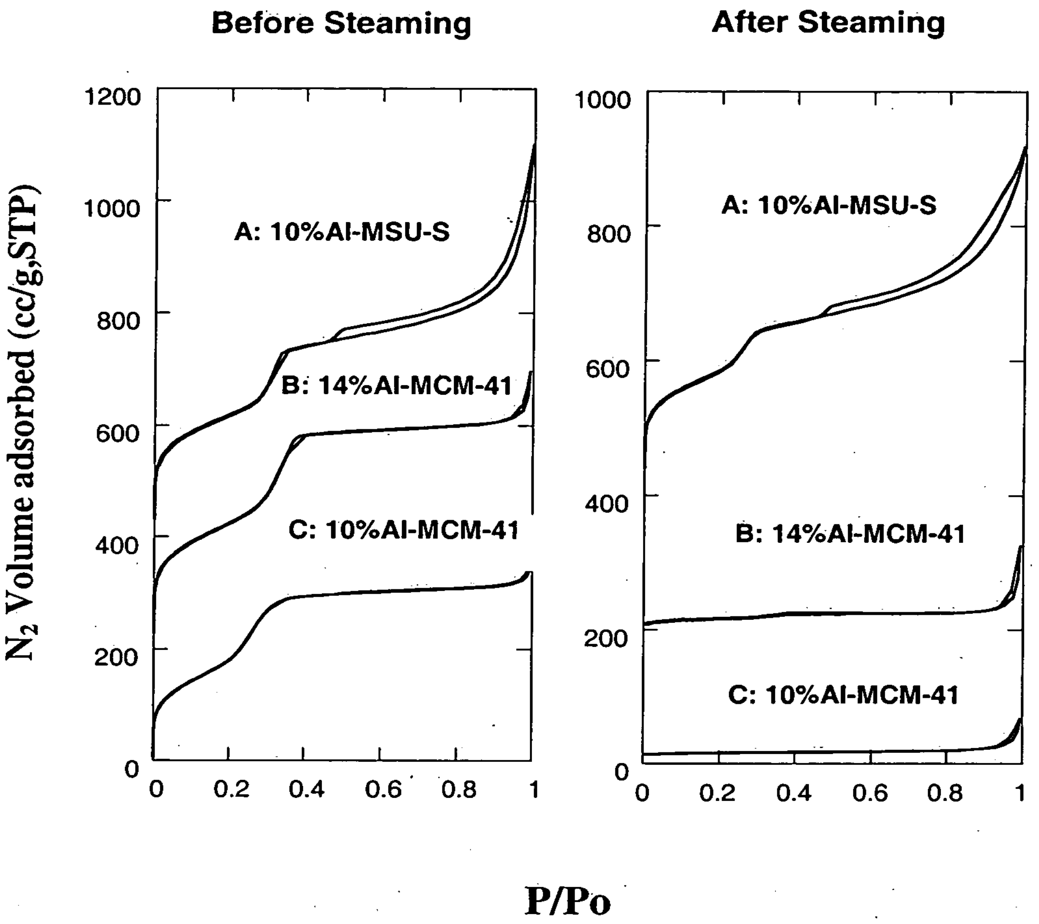


Figure 13A

Figure 13B

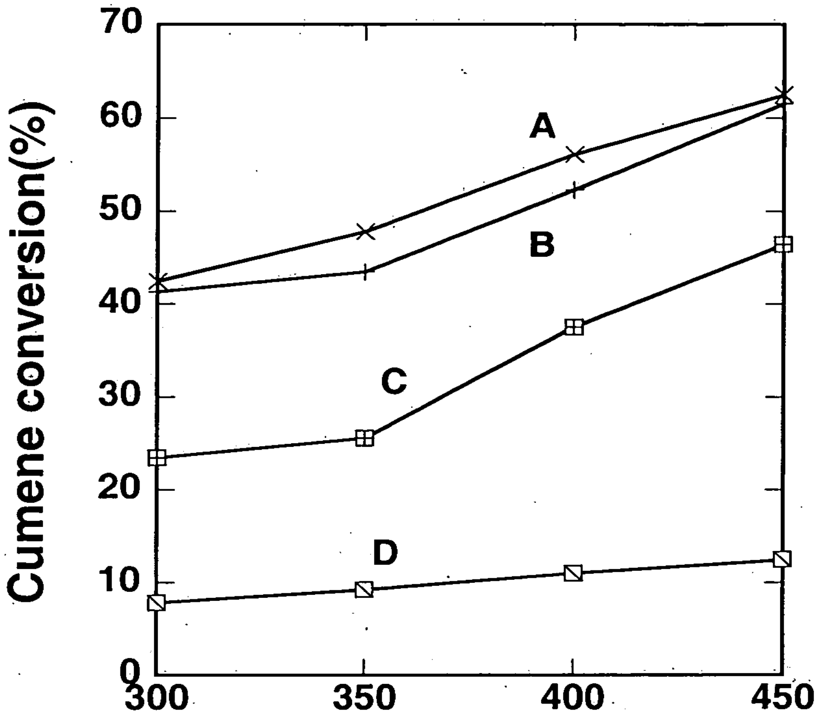


Figure 14

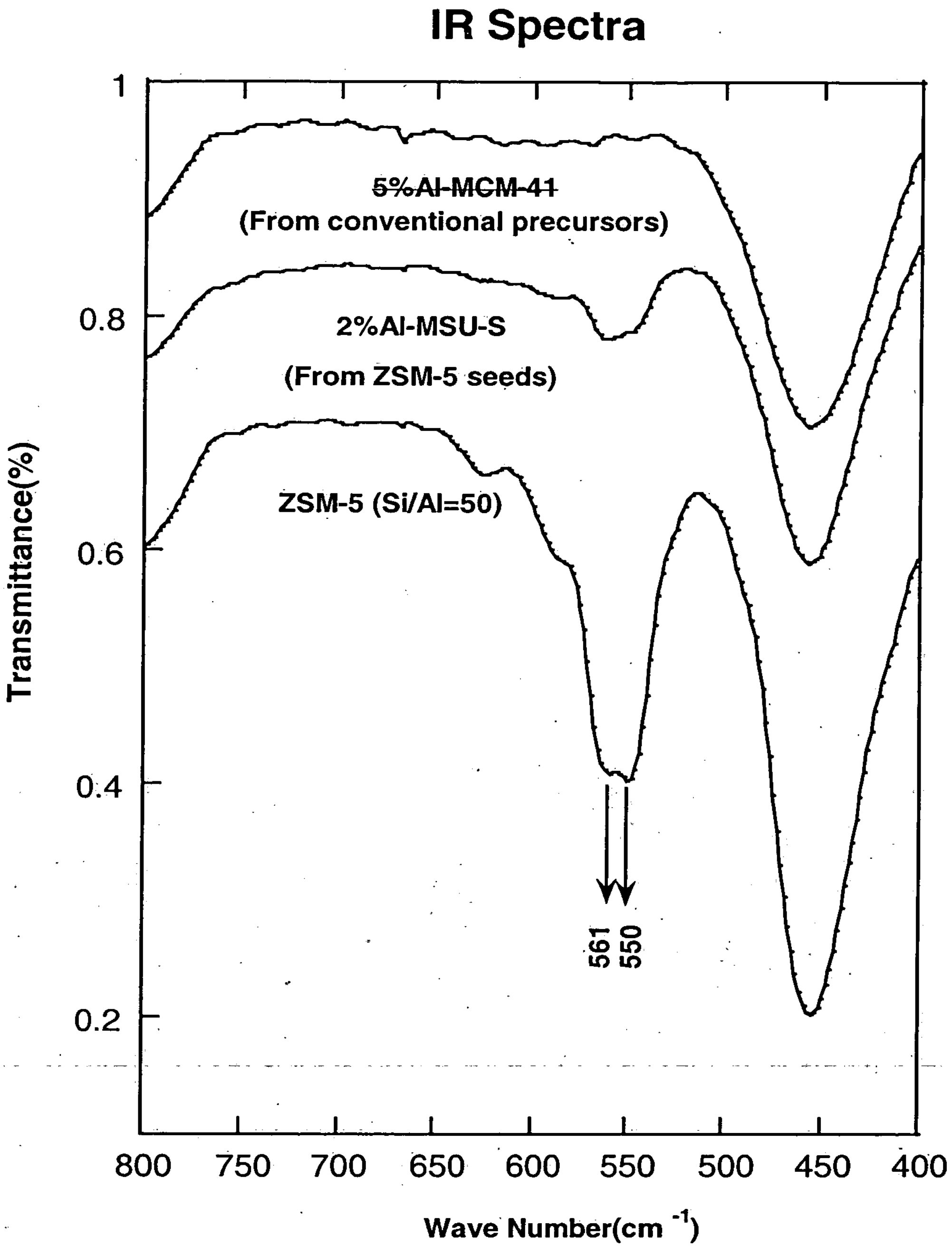

IR Spectra
Transmittance(%)
1
0.8
0.6
0.4
0.2
~~5%Al-MCM-41~~
(From conventional precursors)
2%Al-MSU-S
(From ZSM-5 seeds)
ZSM-5 (Si/Al=50)
561
550
800
750
700
650
600
550
500
450
400
Wave Number(cm $^{-1}$)

Figure 15

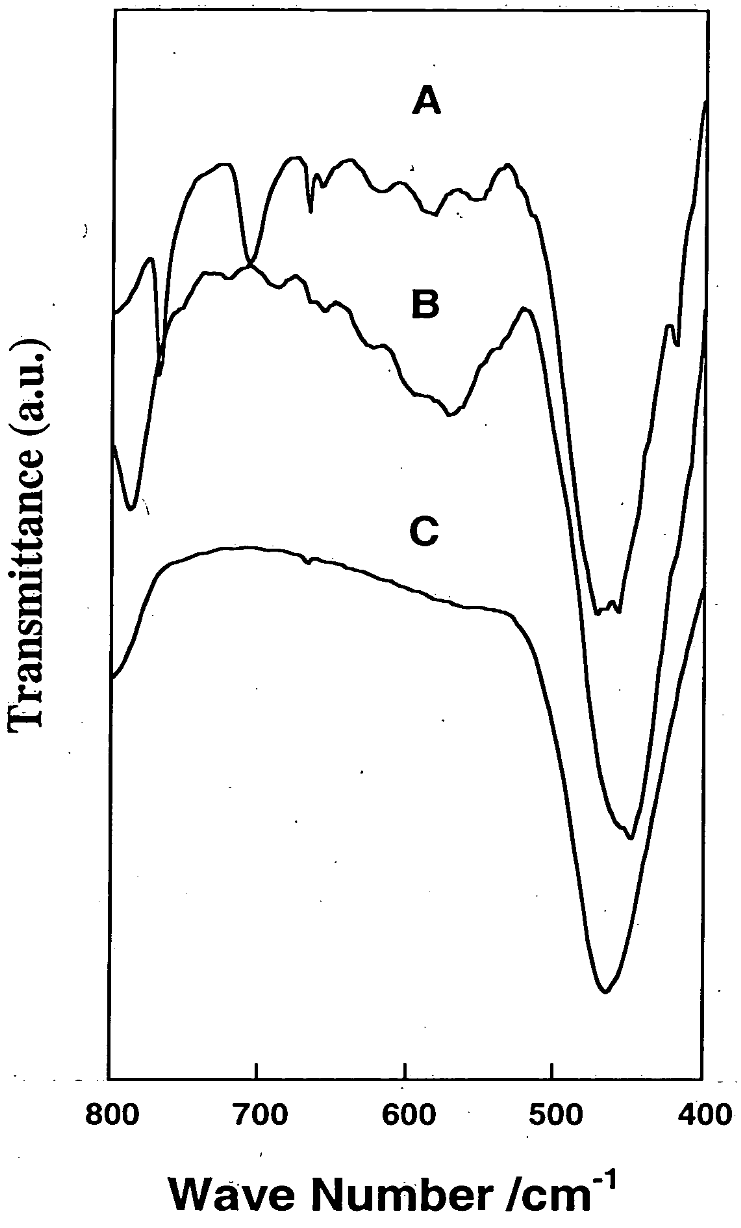


Figure 16

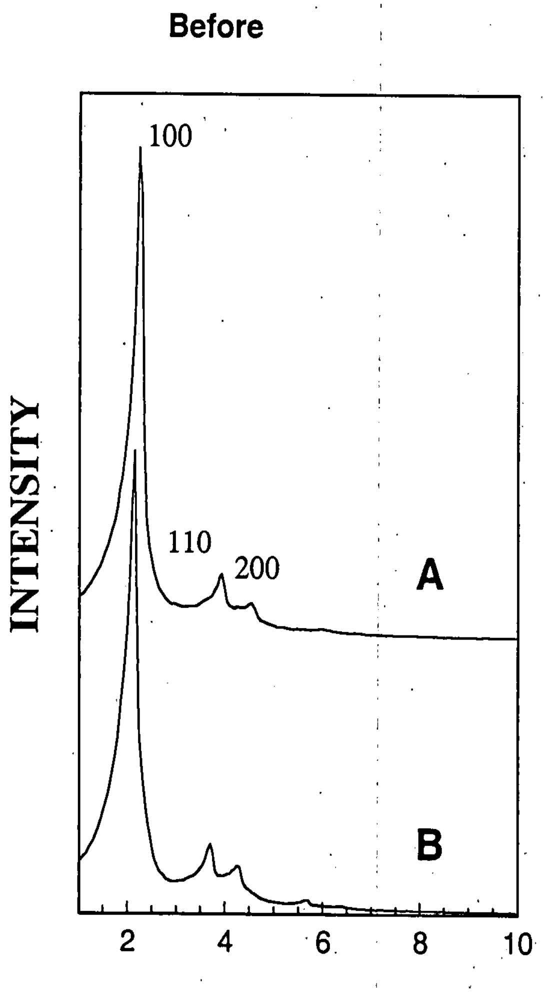


Figure 17A

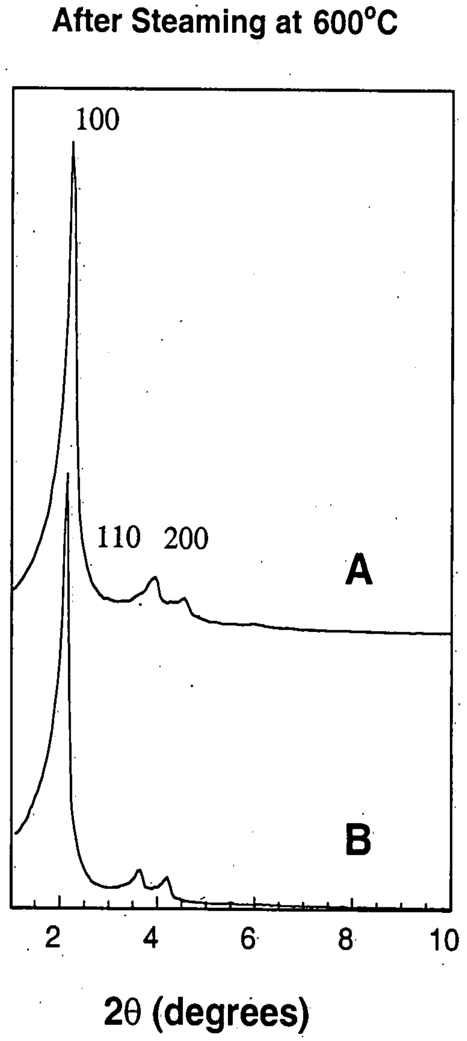


Figure 17B

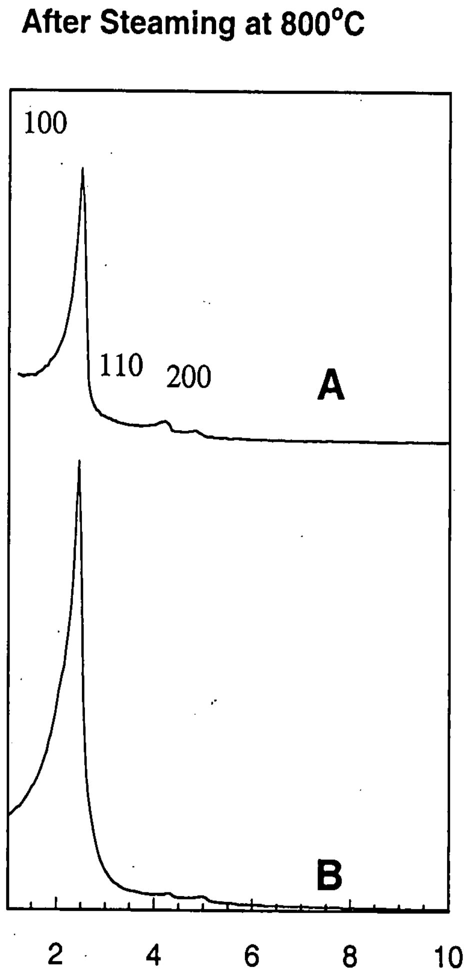


Figure 17C

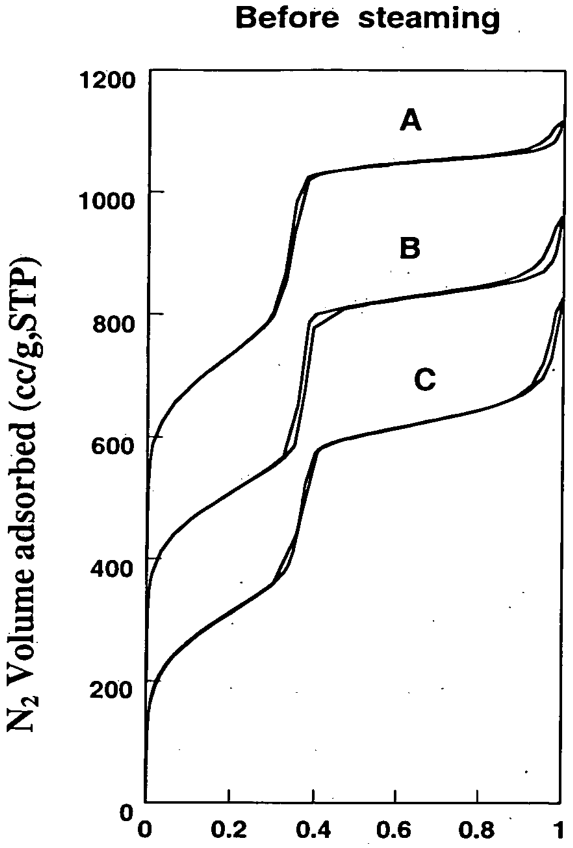


Figure 18A

P/Po

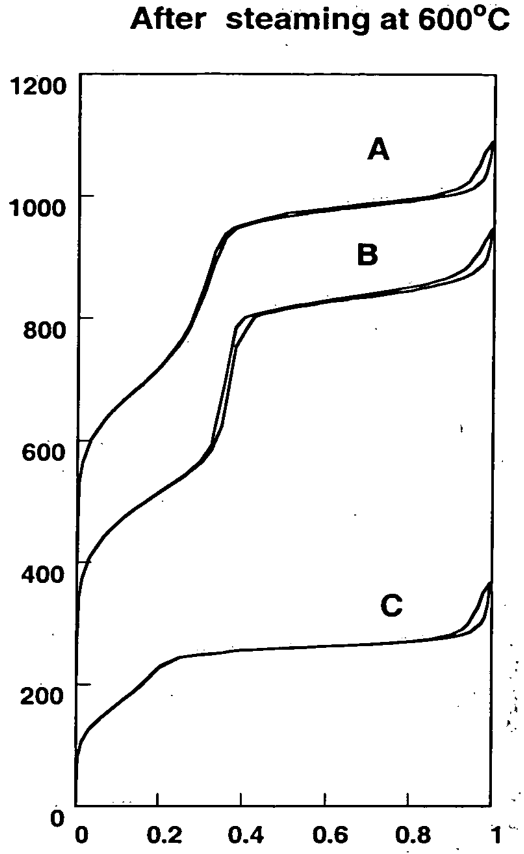


Figure 18B

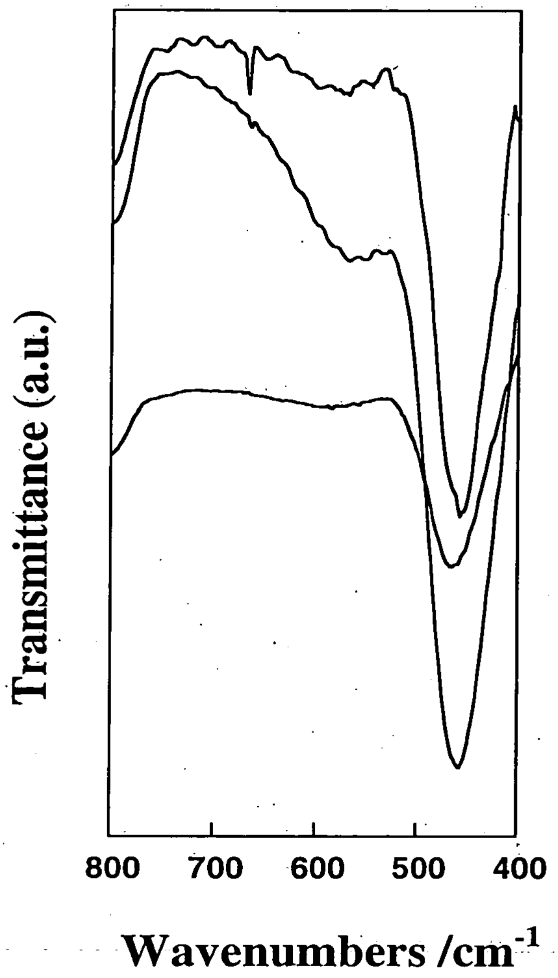


Figure 19

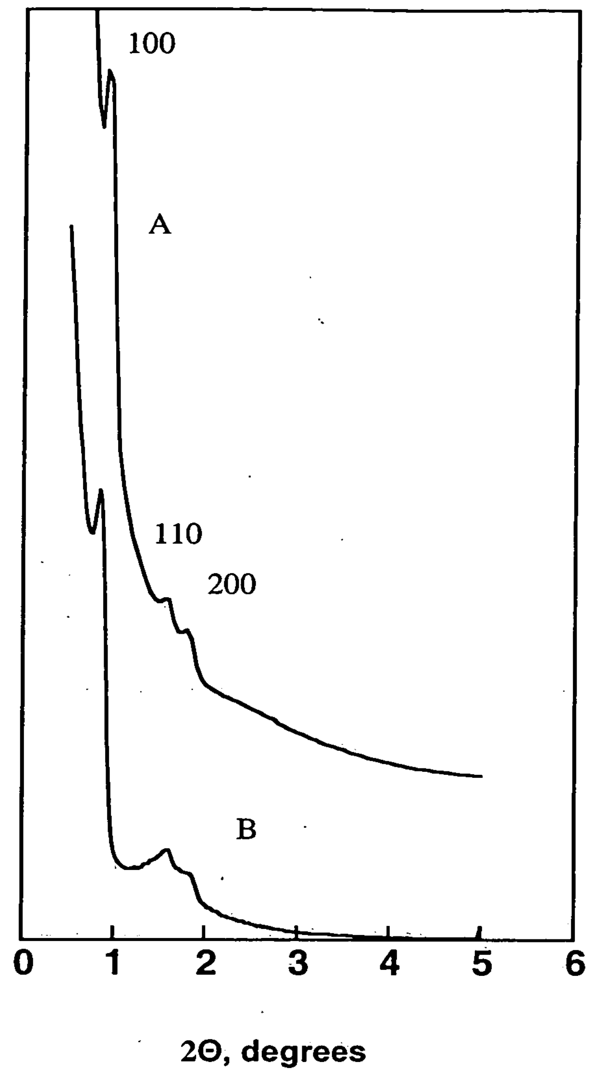


Figure 20

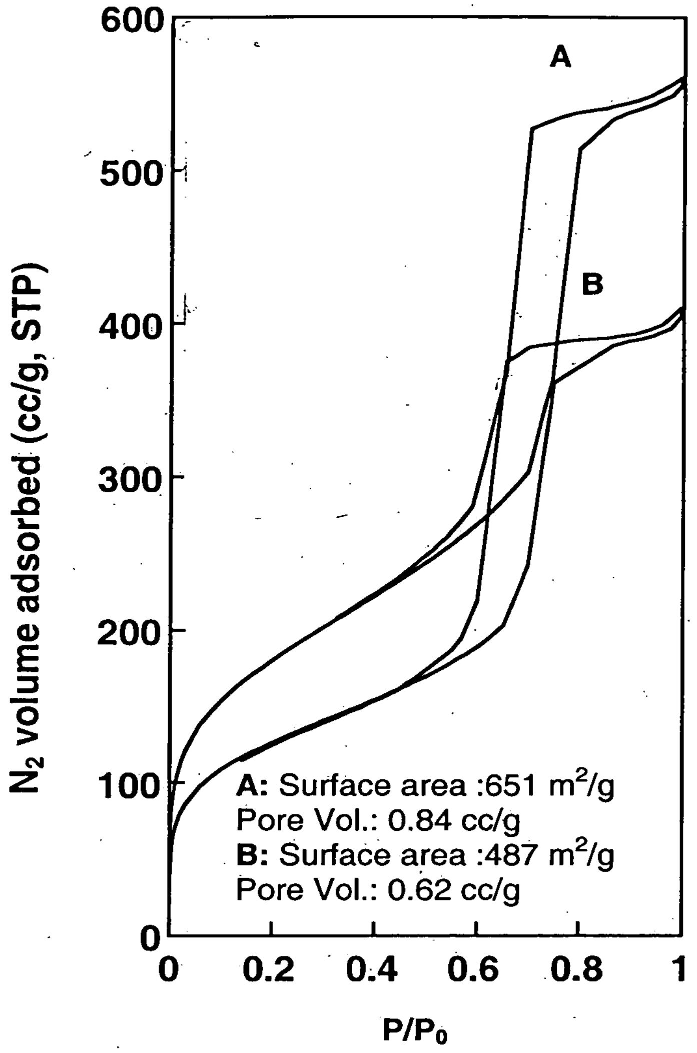


Figure 21

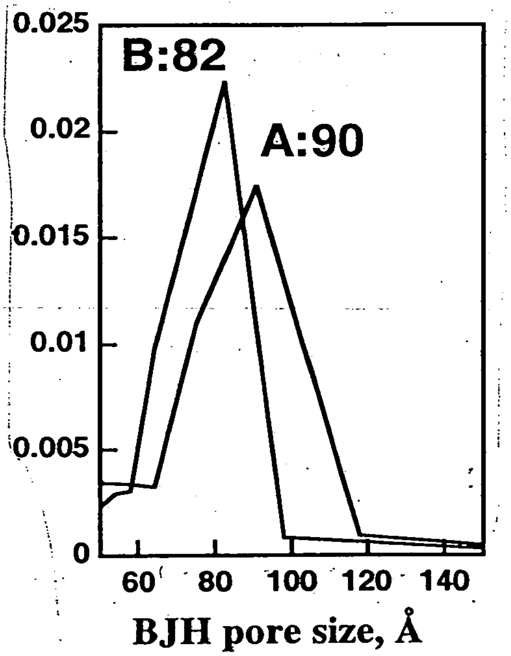


Figure 21A

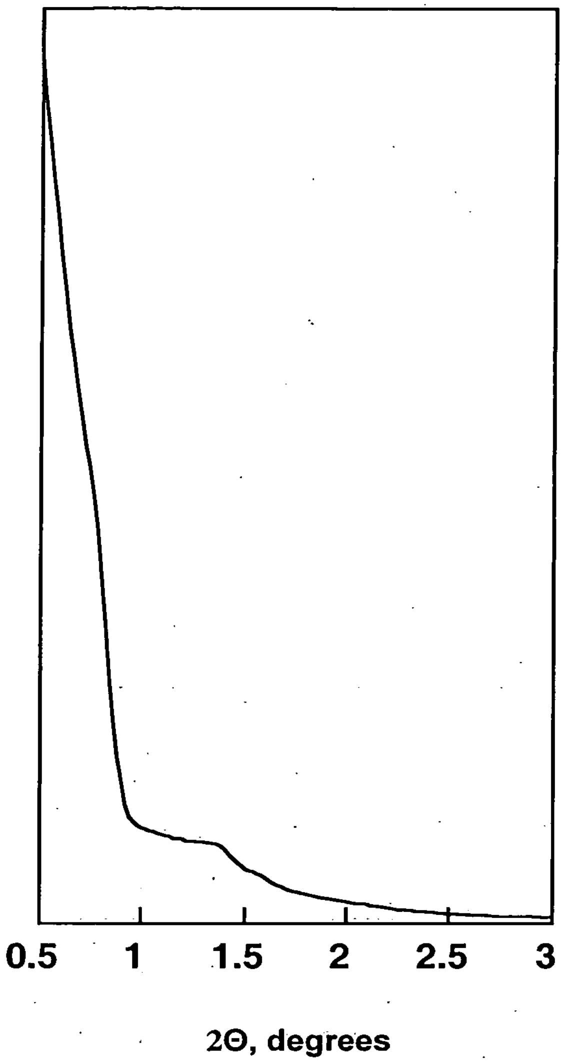


Figure 22

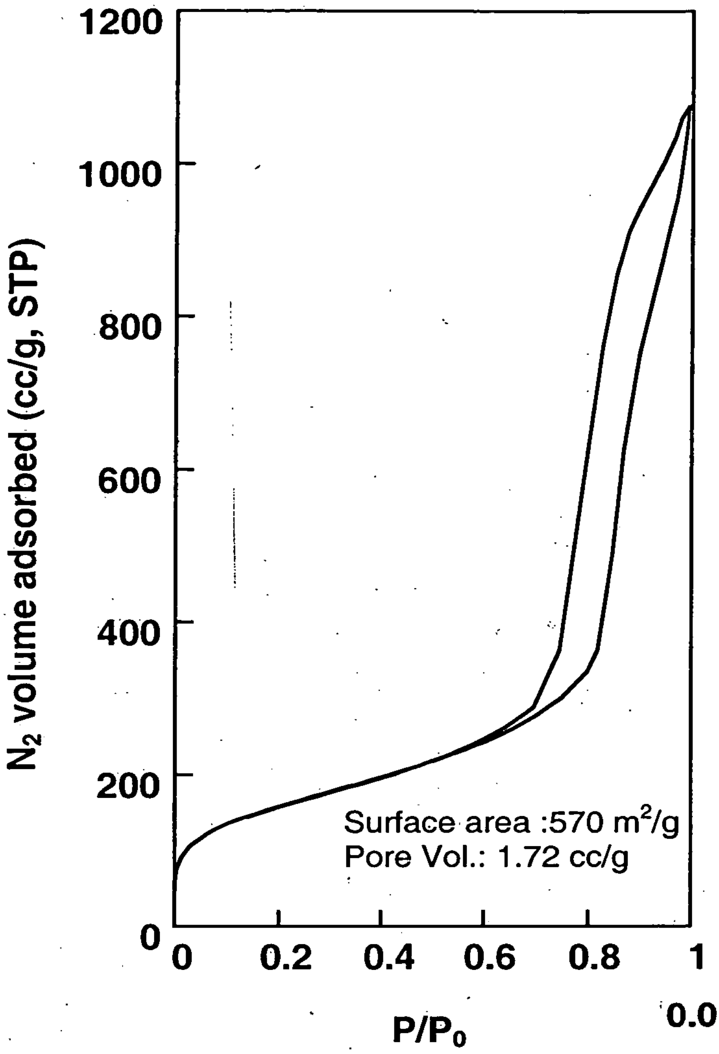


Figure 23

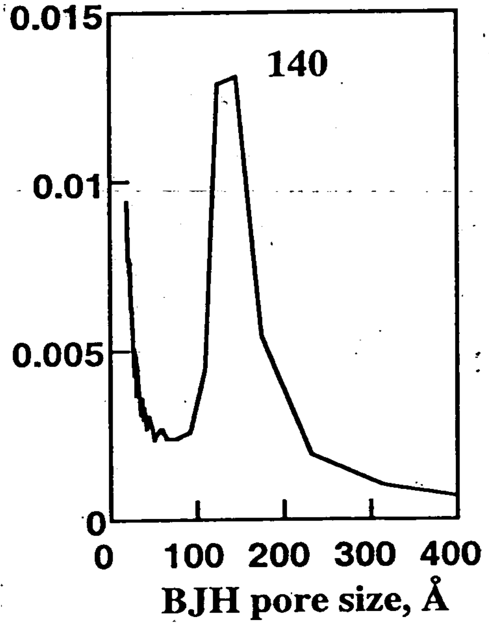


Figure 23A

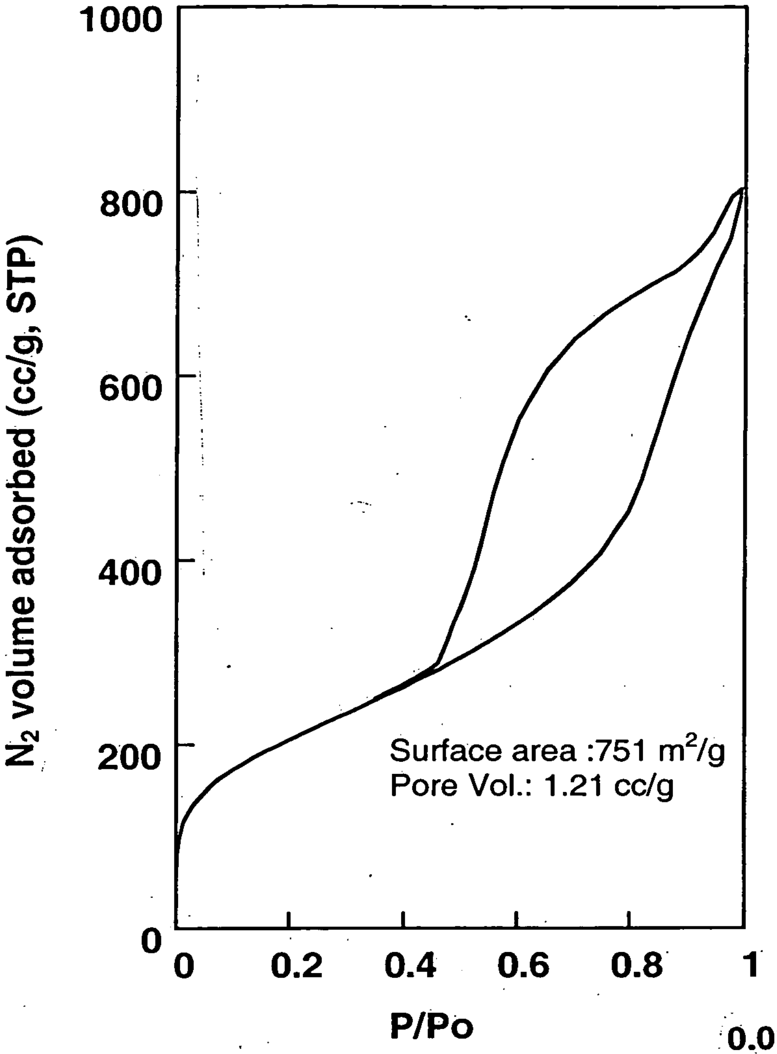


Figure 24

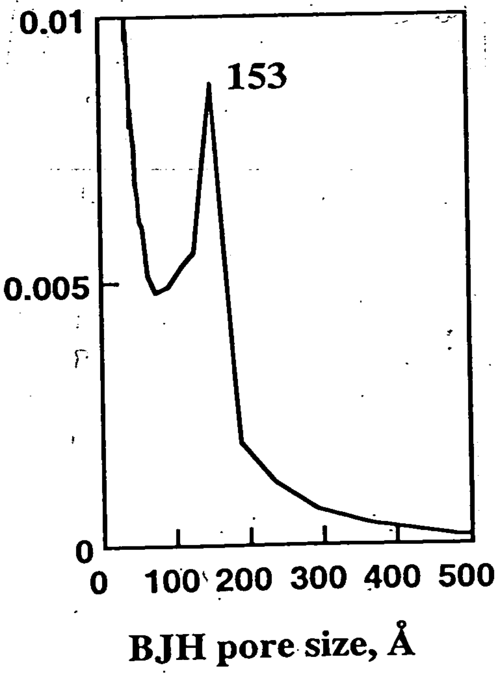


Figure 24A

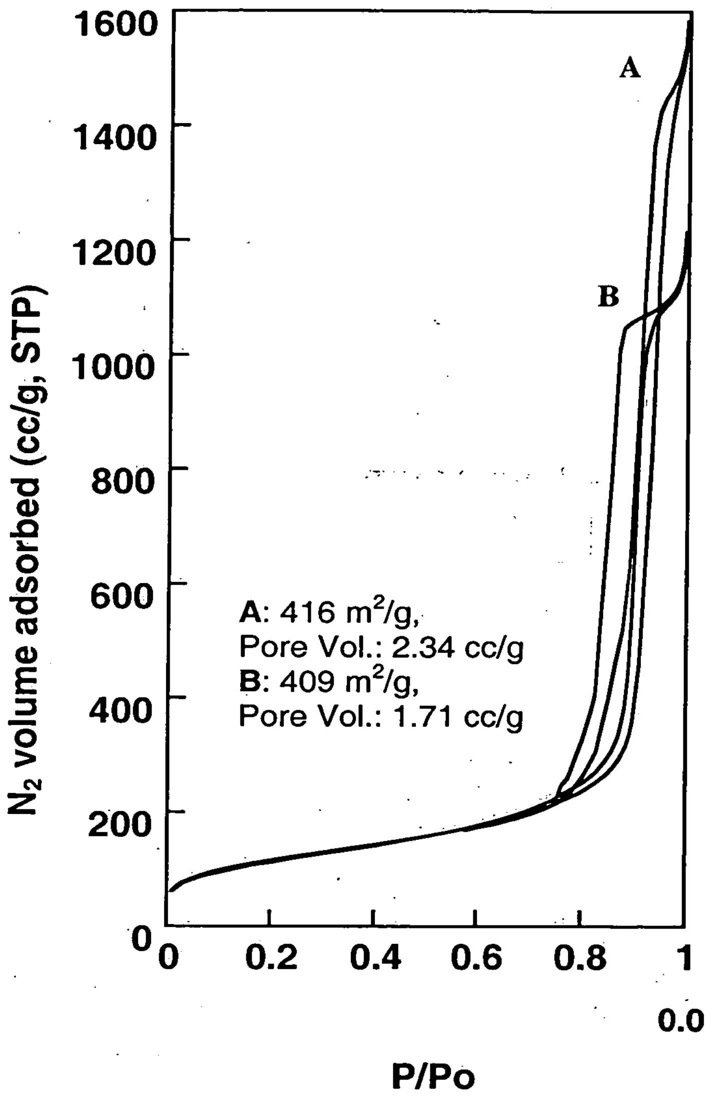


Figure 25

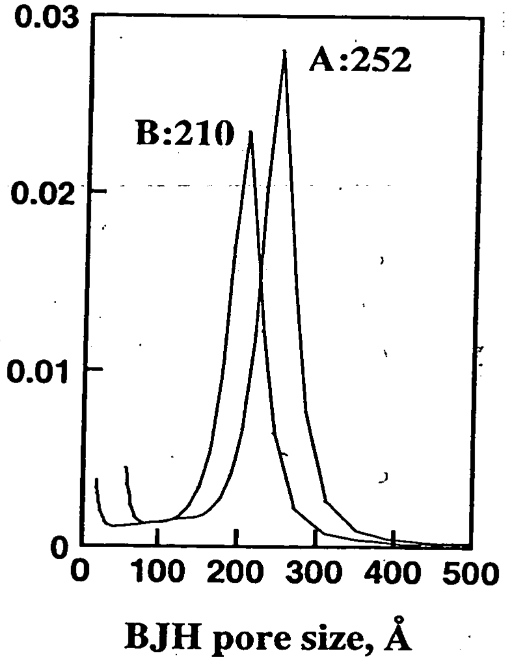


Figure 25A

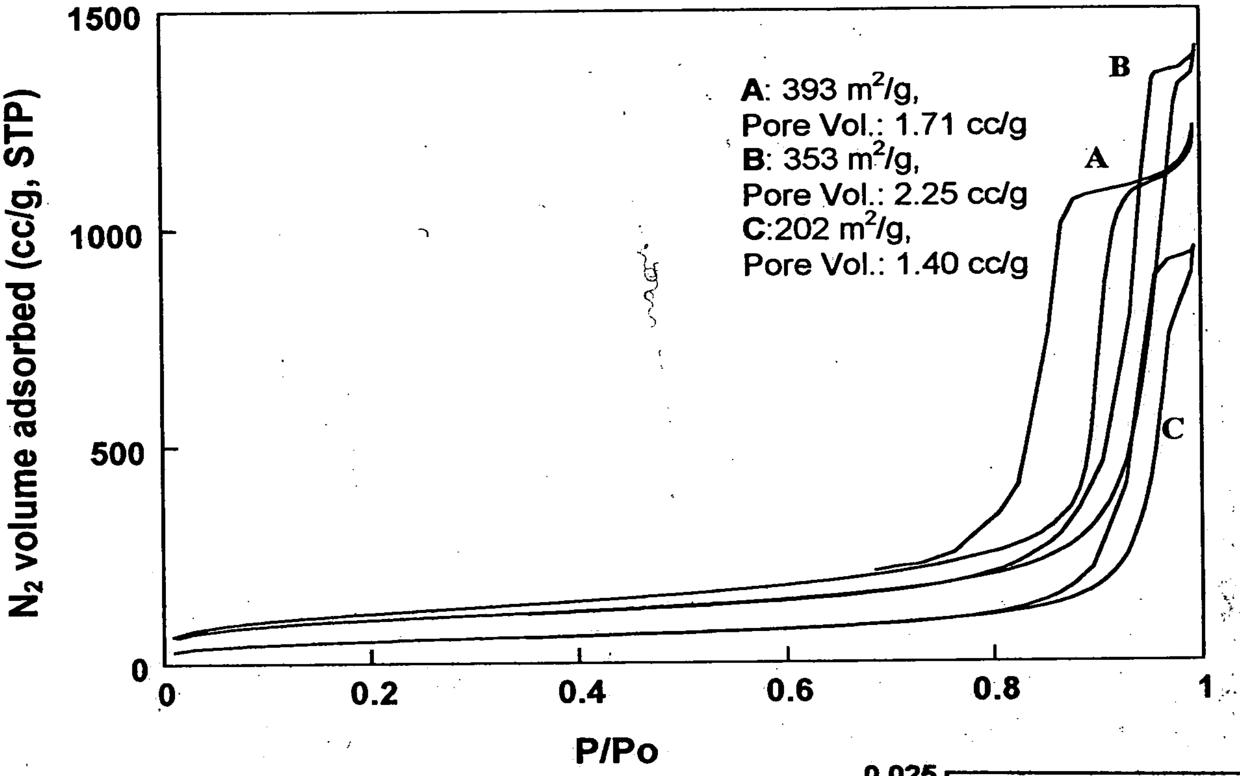


Figure 26

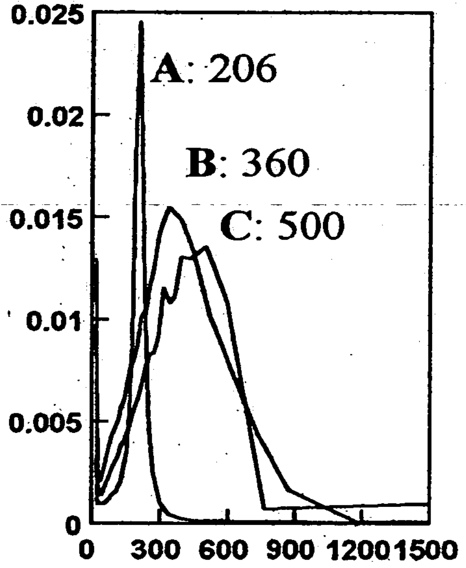


Figure 26A

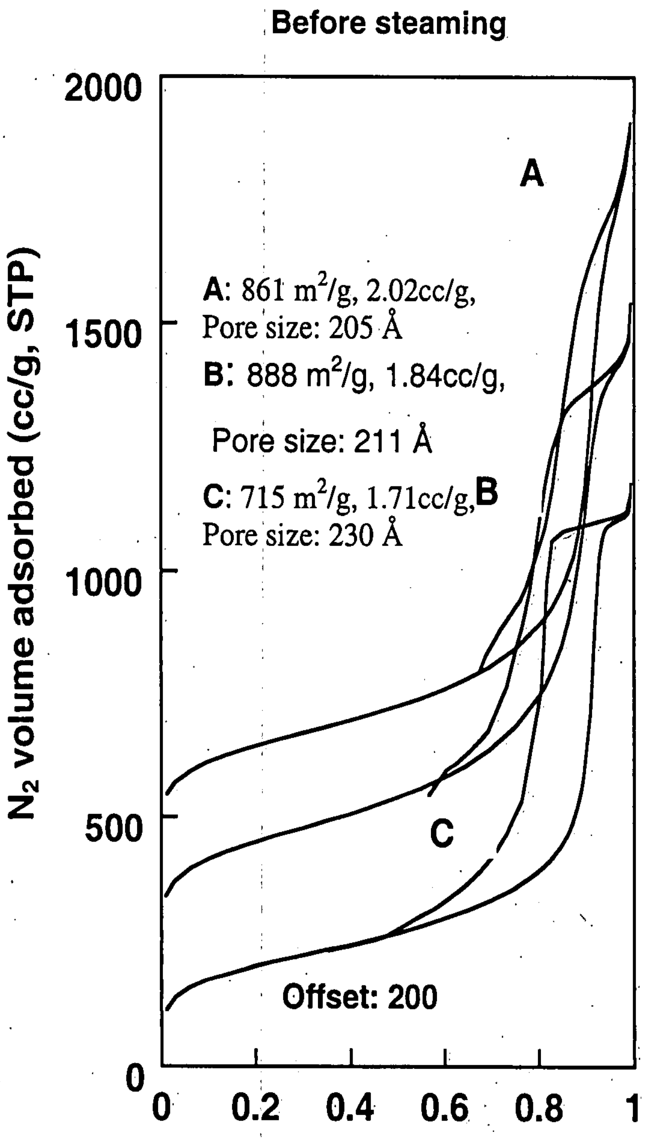


Figure 27A

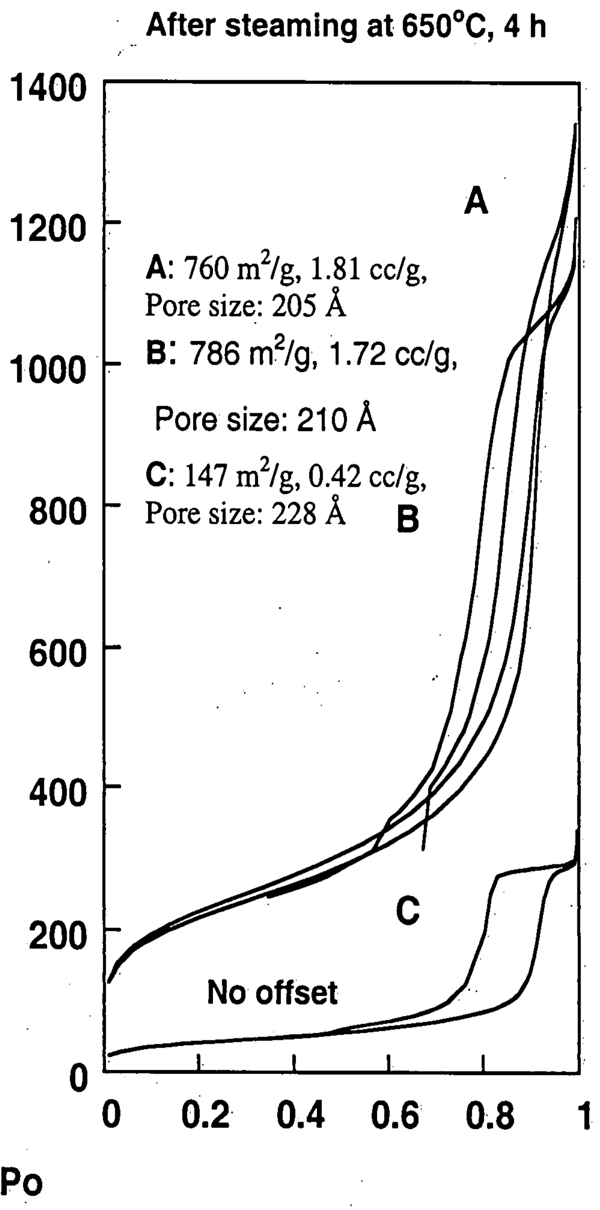


Figure 27B

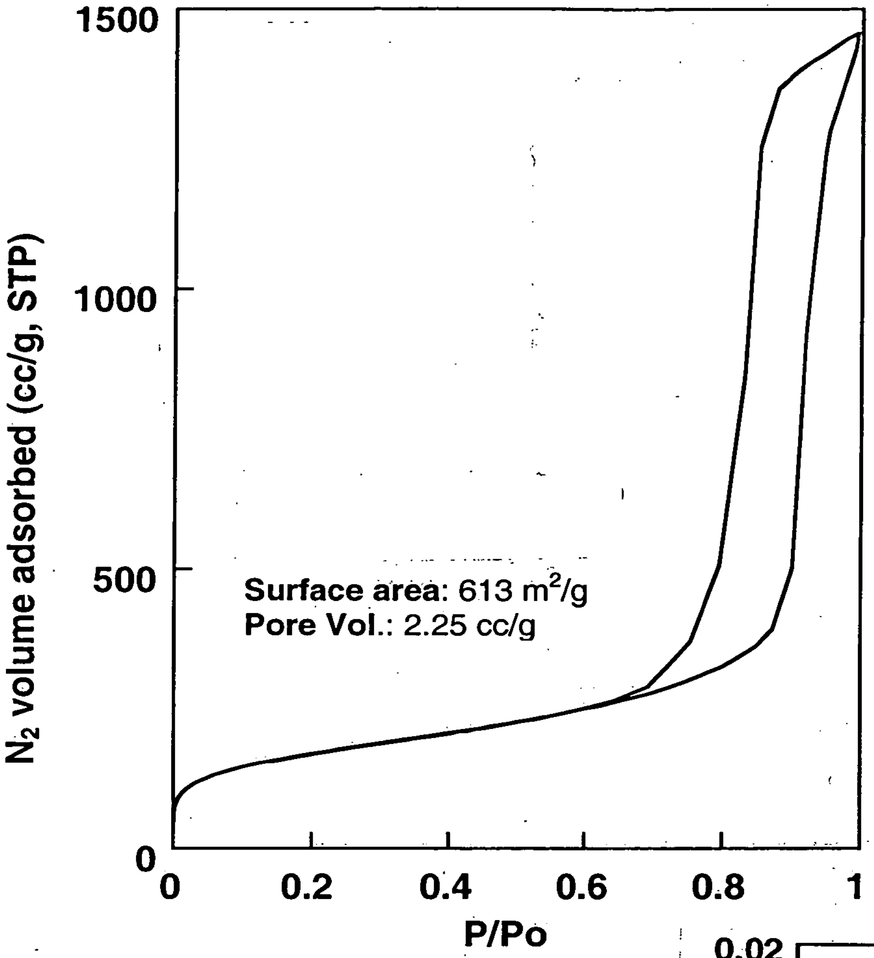


Figure 28

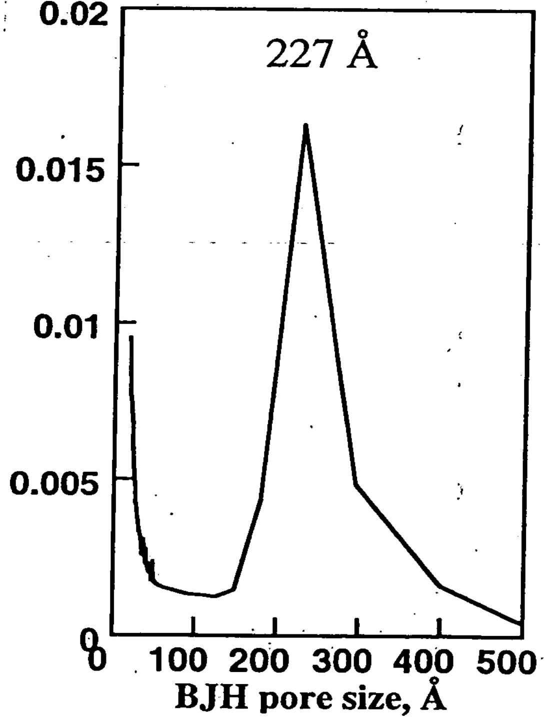


Figure 28A

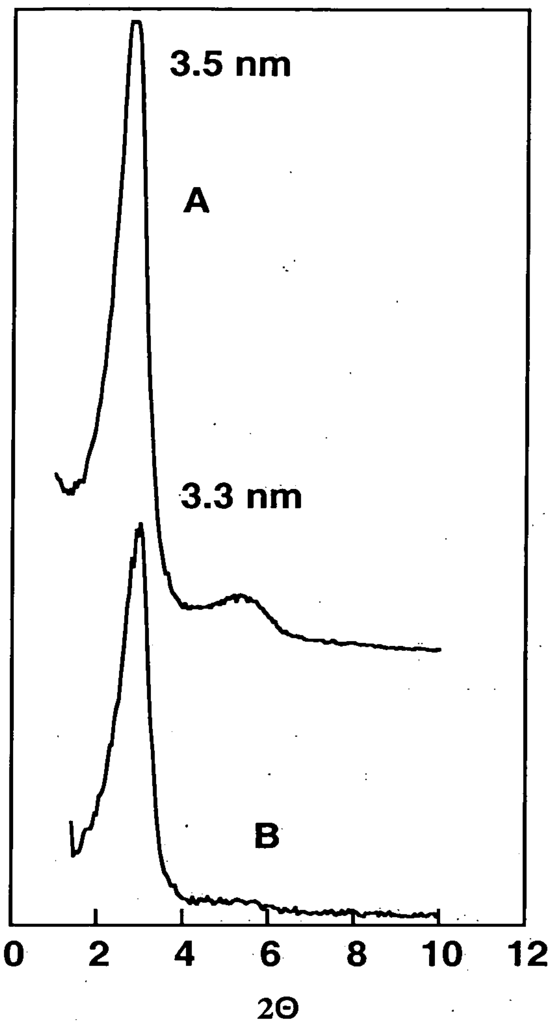


Figure 29

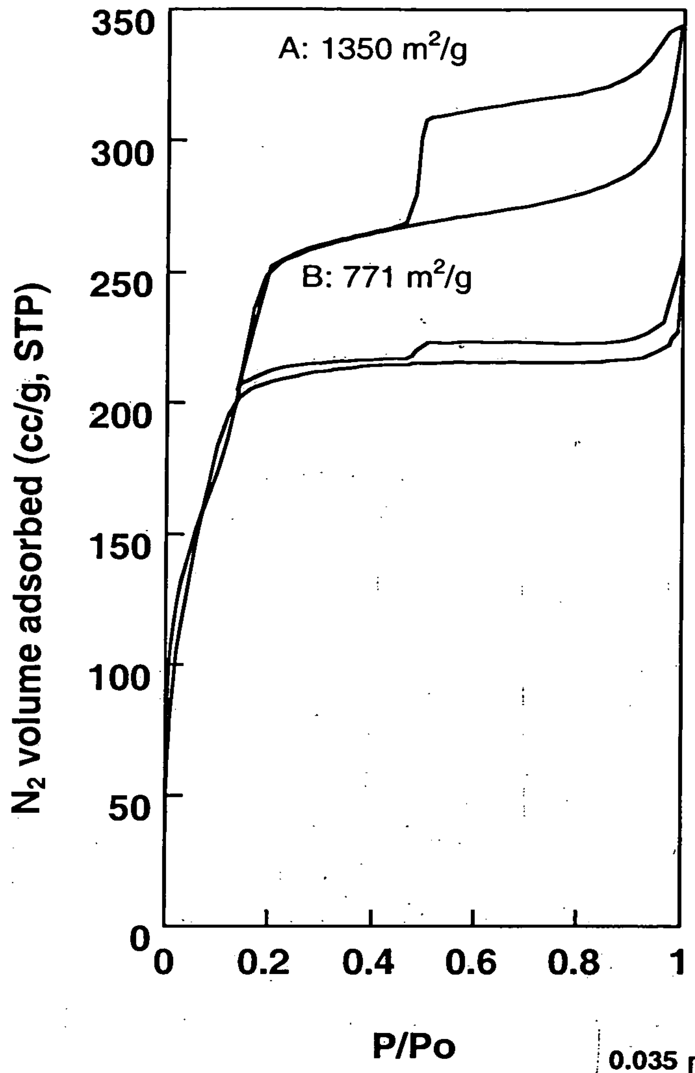


Figure 30

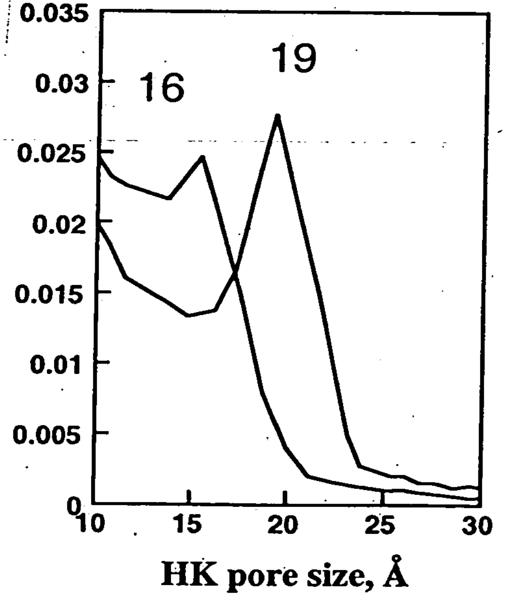


Figure 30A

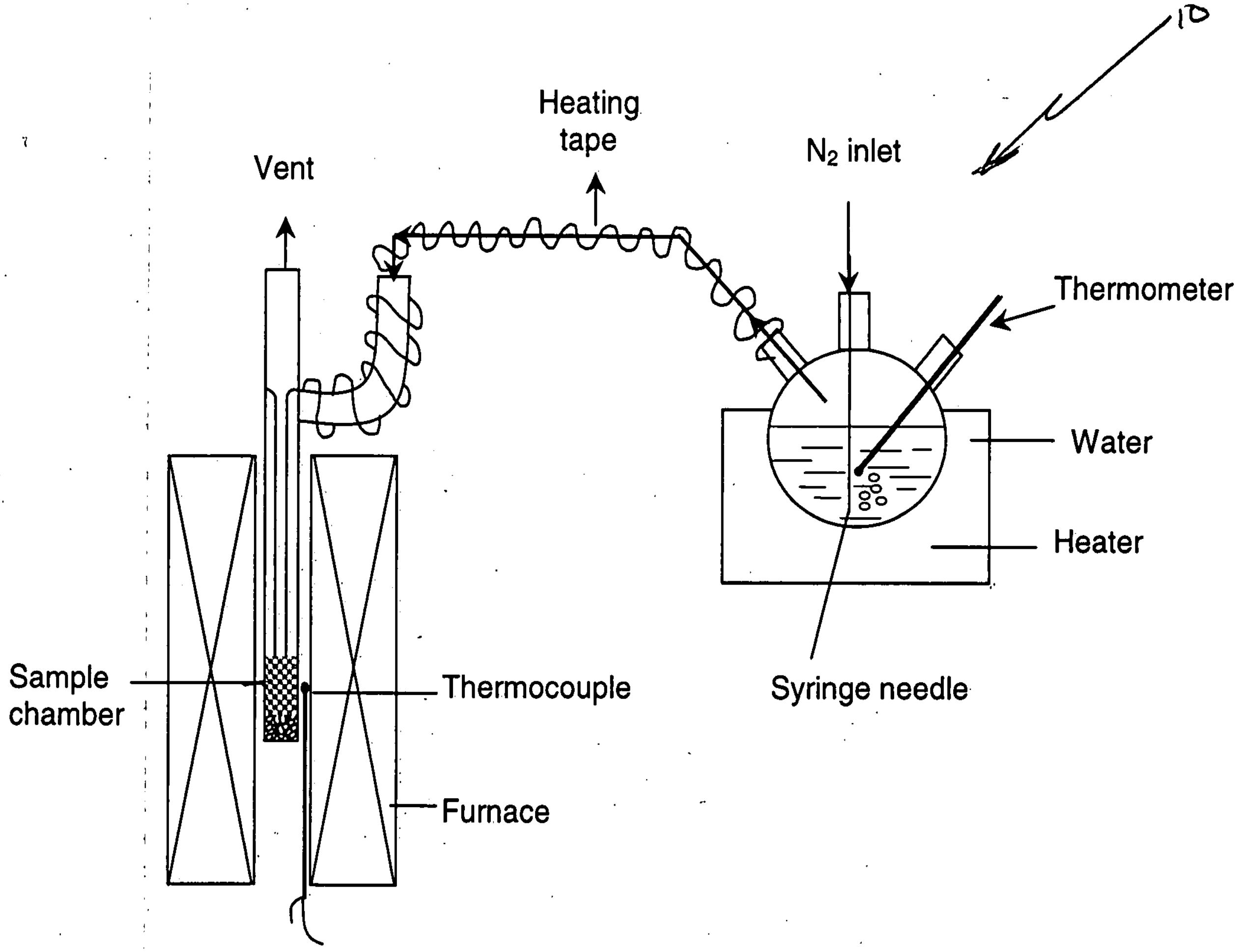

10
Heating tape
Vent
$N_2$ inlet
Thermometer
Water
Heater
Sample chamber
Thermocouple
Syringe needle
Furnace

Figure 31

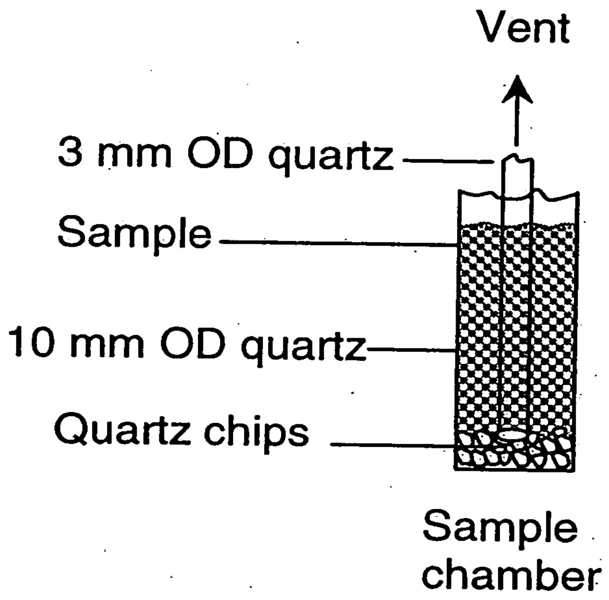

Vent
3 mm OD quartz
Sample
10 mm OD quartz
Quartz chips
Sample chamber

Figure 31A